Work as many of the following problems as you can in one hour. To assure partial credit, show your work.

No calculators are permitted for this exam.

(10) 1. Find an equation for the tangent line to the graph of \( y = e^{xy} \) at the point \( x = 0, \ y = 1 \).

(10) 2. Find the volume of the solid given by revolving the curve \( y = e^{-x} \) around the \( x \)-axis, from \( x = 0 \) to \( x = 1 \).
3. A certain drug is eliminated from the bloodstream at an exponential rate. It is found that, after 10 hours, 90% of the initial dose has been eliminated. Find a formula for the amount $A$ of the drug which remains in the blood $t$ hours after an initial dose of 50 mg.

4. Find the derivative of the function $y = (x + 1)^x$ at the point $x = 0$, $y = 1$. 
(32) 5. Evaluate the following integrals.

(a) \( \int \frac{e^{2x}}{1 - e^{2x}} \, dx \)

(b) \( \int_{0}^{1/2} \frac{x \, dx}{16x^{4} + 1} \)

(c) \( \int_{1}^{e} \frac{2 \ln x}{x} \, dx \)

(d) \( \int_{\sqrt{2}}^{2} \frac{dx}{x \sqrt{x^{2} - 1}} \)  \hspace{1cm} (Give an exact numerical answer.)
(16) 6. Evaluate the following limits.

(a) \[ \lim_{x \to \infty} \frac{\sqrt{2x^2 - x + 1}}{x} \]

(b) \[ \lim_{x \to 0} \frac{x - \sin x}{x^3} \]

(c) \[ \lim_{x \to 0^+} x \ln x \]

(d) \[ \lim_{x \to \infty} (\ln x)^{1/x} \]